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OREGON STATE UNIVERSITY

DEPARTMENT OF SOIL SCIENCE
(503) 754-2441

CORVALLIS, OREGON 97331

July 24, 1973

MEMORANDUM

TO: Mr. Ed Crump, ERTS Technical Officer, SR-345

FROM: G. H. Simonson, UN619 G.H.S. (dh)

SUBJECT: 1) Special Report of ERTS results 2) Project personnel record

1) The enclosed report of non-contract work using ERTS imagery for monitoring field burning in western Oregon is being submitted for inclusion in NASA reporting so that it can be released locally. Mention was made of this report in the summary of our Type I progress report for May-June, 1973 but was not sent with it.

2) We suggest that the NASA Computer Records be updated to show Dr. William T. Pyott rather than Dr. Dillard Gates as Range co-investigator and Dr. Joel A. Norgren rather than Dr. Ellis Knox, as Soil Science co-investigator. These changes reflect the actual participation and responsibility of these men in the project since its initiation.

Thank you.

GHS:dh

Enclosure: special report

cc: Contracting Officer
Project Scientist
Scientific Montior
NASA S.T.I.F.

5P8.

ERTS-1 IMAGERY ENABLES MONITORING OF FIELD BURNING IN WESTERN OREGON

C. E. Poulton & D. Jaques

Environmental Remote Sensing Applications Laboratory
Oregon State University
Corvallis, Oregon 97331

An important problem in Oregon relating to environmental quality and also of critical importance to one of Oregon's major industries, grass seed production, is the monitoring and management of post-harvest field burning as a disease control measure in rye grass seed production. On two color reconstituted frames taken of the Willamette Valley, Oregon, on 29 July 1972, we observed that all burned fields stood out in sharp contrast to other agricultural crop conditions. Since the Oregon Department of Environmental Quality (DEQ) is charged with the responsibility of supervising field burning to minimize air pollution and smog buildup hat sometimes is sufficiently serious to interfere with commercial air traffic, we speculated that ERTS imagery may more economically provide information useful in monitoring the effectiveness of control programs (Figure 1).

We contacted DEQ, discussed the idea, and came to the conclusion that monitoring by ERTS would probably not replace the present day-to-day and month-to-month tabulation of burned acreages by Fire Control District. DEQ feels that this kind of short-term record is essential to their control and management of this activity. They are, however, concerned about the effectiveness of their control and burning management program as this is reflected in permit applications and approvals--these being the basis for tabulating progress in field burning. In western Oregon, cloud problems may stand in the way of complete reliance on ERTS imagery for monitoring, but it may have application in the less cloudy areas of eastern Oregon where field burning is also practiced. Thus, a comparison between burned acreage as recorded by DEQ and as measured from the above ERTS imagery was considered a worthwhile exercise as a prelude to more critical evaluation of feasibility.

The above color reconstitutions were not received in time to perform field checks, but the images were sufficiently unique to minimize the possibility of false interpretations. Copies of the burning record compiled

by DEQ showed that as of 29 July 1972, 10,620 acres had been burned in the Willamette Valley. We counted and measured the burned fields from the two ERTS frames covering the valley. The acreage determined from ERTS was 10,940 acres or 320 acres larger than the DEQ figures (+ 3.01%). Working from the 1:1,000,000 scale color reconstitutions, we were pleasantly surprised at such close agreement. Possible sources of error in such comparisons would include:

1. Acres accidently burned or burned without approval, and thus not reported
2. Delays in approved burning beyond a designated time
3. Reservoirs and ponds of 20 acres or less that might be confused, because of their near black color, with a burned field image
4. Fence rows and field borders not measurable on the ERTS imagery and, thus, lumped into burned acreage whereas DEQ records would reflect more nearly the true field acreage.

We feel that the errors from misidentification of small ponds were eliminated in this instance by examining color IR aircraft imagery at a scale of 1:120,000 to verify questionable signatures.

The above ERTS data were tabulated in 3 manhours. The tabulation from DEQ records was not specifically determined, but it was estimated to have required 100 manhours to produce the same record. With more practice and experience, plus real-time ground checking of questionable signatures, both the speed of interpretation and accuracy of the determinations could be significantly increased.

It thus appears that for regions of minimum cloud interference, monitoring of field burning activities from ERTS could be a feasible application of the ERTS system. To be feasible in management of burning activities, however, the lag time between image acquisition and delivery would have to be cut under 18 days. As a double check on program effectiveness, on the other hand, the periodic determination of burned acreages

from ERTS imagery should serve as a worthwhile cross-check against the day-to-day tabulations maintained by the Department of Environmental Quality. This would indicate areas requiring closer supervision as well as to increase the agency and public confidence in compliance with the air quality control program as it is demonstrated that the permitted burn acreage and the monitored acreage are, in fact, in close agreement.

Figure 1. A portion of ERTS scene over the Willamette Valley, Oregon, July 29, 1972. This scene shows the burned grass fields as dark blue to black in contrast to the white, unburned, harvested, or mature crop fields. Burned field acreage was inventoried within 3% from this ERTS-1 imagery.